

## A New Method for Determination of Critical Parameters of Pure Fluids

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Critical parameters are very important in the field of fluid properties research, and there are some different methods to determine the critical parameters. The most popular method to determine critical parameters is that the meniscus disappears. In this paper, with dimethyl ether and 1,1-difluoroethane (HFC152a), the phenomenon of critical opalescence was studied systematically and a new criterion for determining critical parameters of pure fluids was provided. Based on the experiment phenomenon, it was found that meniscus disappearance depends on the rate of temperature increase, and also, the repeatability is pertinent to the experimentalist. After repeating experiments many times and performing comparisons, it was found that the measured temperature at which a black point appears during the time of temperature decrease is higher than the point at which the meniscus disappears, but the black point has good stability and repeatability. Hence, if the black point is considered as the critical point, the critical parameters may have higher precision than the parameters obtained from the point at which the meniscus disappears. Also, the time to measure the critical parameters with the black point is shorter. With this criterion, the critical temperatures of HFC152a (1,1-difluoroethane) and DME (dimethyl ether) were measured, and the results indicated that: the critical temperatures of HFC152a and dimethyl ether were 386.46 K and 399.62 K, respectively.

Keywords: critical parameters; dimethyl ether; HFC152a